REMARKS

Claims 13, 14, and 42 have been amended. Claims 44-48 have been added. Claims 13, 14, 16, 17, 42 and 44 are now pending. The Title of the Invention has been amended to correspond more closely to the pending claims. Applicants reserve the right to pursue the original claims and other claims in this and other applications. Please reconsider the above-referenced application in light of the foregoing amendments and following remarks.

Claims 13, 14, 16, and 17 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The rejection is respectfully traversed.

The Office Action asserts that "nowhere in the specification is it stated that the pressure is 'held at about atmospheric pressure.'" (pg. 2). This is not true. Applicants' specification discloses that "[i]n general, the [reaction chamber's] pressure can be at about atmospheric pressure." (pg. 9, lines 2-5) (emphasis added). Accordingly, the instant application supports the claim limitation that "the pressure of said rapid thermal process chamber is held at about atmospheric pressure," as recited in claim 13.

The Office Action further asserts that "this limitation is not enabled because the specification fails to indicate how the wet oxidation would be carried out using *in situ* reaction of hydrogen and oxygen at a pressure of about 1 atmosphere." (pg. 2). Applicants respectfully submit, however, the Office Action reads a limitation into claim 13 that is not present. Claim 13 does not recite that the reaction of hydrogen and oxygen gases are carried out *in situ* in a reaction chamber.

For example, claim 13 recites, *inter alia*, a method of "depositing a dielectric film . . . subjecting the dielectric film to a densifying treatment . . . subjecting said stabilized dielectric film to a wet oxidation with steam process . . . said steam being carried to the chamber, wherein the temperature of said chamber is from approximately 450 °C to about 1050°C, wherein said film is subjected to said process for a duration of about 20 seconds to about 60 seconds, wherein the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5 and the pressure of said rapid thermal process chamber is held at about atmospheric pressure." Claim 13 does not recite that hydrogen and oxygen gases react *in situ*.

The Office Action then asserts that "the instant specification at p. 9, lines 2-5 teaches away from such high pressures [e.g., atmospheric pressure] when H_2 and O_2 mixtures are used to generate the steam." (pg. 3). This is not true. Applicants' specification provides that "if the H_2 and O_2 gases are combined in the chamber 50, then the pressure should be kept lower, for example, around 1 millitorr." (pg. 9, lines 2-5) (emphasis added). Claim 13, however, does not recite that H_2 and O_2 gases are combined in a reaction chamber, e.g. occur *in situ*.

Claims 14, 16, and 17 depend from independent claim 13. Accordingly, Applicants respectfully submit that claims 13, 14, 16 and 17 are enabled by the specification and the § 112, first paragraph, rejection therefore be withdrawn.

Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,891,809 ("Chau") in view of Van Zant, Microchip Fabrication, 4th Ed. (pp. 163-164) (2000) ("Van Zant I"). The rejection is respectfully traversed.

Applicants respectfully submit that Van Zant I is not a proper reference for purposes of a § 103(a) rejection of claims 13 and 14. Van Zant I has an effective reference date of sometime in 2000. The present application is a divisional of U.S. Patent Application No. 09/296,835, filed on April 22, 1999. The present application claims the benefit of the parent's filing date, e.g., April 22, 1999. Accordingly, Van Zant I is not a proper reference.

Accordingly, the proposed rejection of claims 13 and 14 are improper, and claims 13 and 14 are allowable.

Claim 42 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,066,581 ("Chivukula") in view of Van Zant, Microchip Fabrication, A Practical Guide to Semiconductor Processing, 3rd ed., pp. 157-160 (1997) ("Van Zant II"). The rejection is respectfully traversed.

Claim 42 recites, *inter alia*, a method of "depositing a dielectric film . . . and subjecting the dielectric film to a wet oxidation with steam process . . . by heating a mixture of hydrogen and oxygen gases . . . at a temperature greater than about 450°C, wherein said mixture is a ratio from 0.1 to approximately 0.80 of hydrogen gas to oxygen gas and combined in said rapid thermal process chamber, and said rapid thermal process chamber has a pressure of around 1 millitorr."

The cited references do not teach or suggest that hydrogen and oxygen gas are combined in a rapid thermal process chamber which has a pressure of around 1 millitorr. Chivukula does not teach or suggest reacting hydrogen and oxygen to provide steam. The Office Action relies upon Van Zant II for disclosing a dry oxidation system that forms steam ("Dryox"). The Office Action asserts that in Van Zant II, a mixture of hydrogen and oxygen gases react to form a steam oxidizing mixture in a

reactor. This is not true.

Van Zant II discloses that in Dryox, "gaseous oxygen and hydrogen are introduced directly into the oxidation tube. Inside the tube, the two gases mix and, under the influence of the high temperature, form steam. The result is a wet oxidation in steam." (pg. 160) (emphasis added). Van Zant II does not teach or suggest that the hydrogen and oxygen gas are combined in the rapid thermal process chamber. Van Zant II merely discloses combining the two gases in an oxidation tube, which is different from Applicants' claimed method of combining the hydrogen and oxygen gas in a rapid thermal process chamber. Accordingly, even if the references are combinable, they still would not teach or suggest that hydrogen and oxygen gas are "combined in said rapid thermal process chamber, and said rapid thermal process chamber has a pressure of around 1 millitorr," as recited in claim 42.

The Office Action further asserts that although the pressure of 1 milliTorr is not taught in Chivukula, "there exists no criticality of the pressure to the practice of the instant invention since pressures as lows as 1 milliTorr (0.001 Torr) and about 760 Torr can be used, according the instant specification." (pgs. 9-10). This is not true. Applicants respectfully submit that the Office Action has misunderstood the claimed invention.

Applicants are not claiming a range of pressures, e.g., that pressures between 1 milliTorr and about 760 Torr can be used. Applicants' specification provides that when "the H_2 and O_2 gases are combined in the chamber 50, then the pressure should be kept lower, for example, around 1 milliTorr." (pg. 9, lines 4-5) (emphasis added). Atmospheric pressure can be employed with Applicants' claimed invention when the gases are not combined in the chamber. Two separate pressures are disclosed for two separate embodiments. The combination of Chivukula and Van Zant II does not teach

or suggest that the gases are combined in a rapid thermal process reaction chamber at a pressure of about 1 milliTorr.

For at least these reasons, the § 103(a) rejection of claim 42 should be withdrawn.

Claims 13, 14, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chivukula in view of Van Zant II, and U.S. Patent Appl. Pub. 2002/0004248 A1 ("Lee"). The rejection is respectfully traversed.

Claim 13 recites, *inter alia*, a method of "depositing a dielectric film . . . subjecting the dielectric film to a densifying treatment . . . subjecting said stabilized dielectric film to a wet oxidation with steam process . . . said steam being carried to the chamber, wherein the temperature of said chamber is from approximately 450 °C to about 1050°C, wherein said film is subjected to said process for a duration of about 20 seconds to about 60 seconds, wherein the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5 and the pressure of said rapid thermal process chamber is held at about atmospheric pressure."

The cited references do not teach or suggest that the pressure in a rapid thermal process chamber is about atmospheric pressure, or that the ratio of steam to other gases in the chamber is the range from about 0.1 to about 0.5. Chivukula does not teach or suggest reacting hydrogen and oxygen to provide steam, e.g., water. The Office Action relies upon Van Zant II for disclosing a Dryox system, e.g., dry oxidation, that forms steam. However, there is no motivation to combine Chivukula and Van Zant II since they teach away from each other.

For example, the Office Action acknowledges that Chivukula discloses subjecting a dielectric film to a wet oxidation with steam process using a mixture comprising water, oxygen, and ozone in a rapid thermal annealing chamber. The Office Action further asserts that wet oxidation is used because it has "superior characteristics during high frequency use compared to using dry oxidation." (Office Action, pg. 7). Van Zant II, however, discloses a "dry oxidation system, [in which] gaseous oxygen and hydrogen are introduced directly into the oxidation tube." There is no motivation to use Van Zant II's dry oxidation system when, as the Office Action asserts, Chivukula's wet oxidation process is superior to a dry oxidation process.

Lee is relied upon for disclosing forming a dielectric film as part of a gate of a transistor and adds nothing to rectify the deficiencies associated with Chivukula and Van Zant II. Moreover, even if the references are properly combinable, they still would not teach or suggest that "the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5 and the pressure of said rapid thermal process chamber is held at about atmospheric pressure," as recited in claim 13. Neither Chivukula nor Van Zant II teaches or suggests that the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5.

Claims 14 and 16 depend from claim 13 and should be similarly allowable for at least the reasons provided above with regard to claim 13, and on their own merits. The § 103(a) rejection of claims 13, 14, and 16 should be withdrawn.

Claims 13, 14, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,136,728 ("Wang") in view of U.S. Patent No. 6,114,258 ("Miner"). The rejection is respectfully traversed.

The Office Action acknowledges that Wang does not teach or suggest that the reaction chamber's pressure is about 1 atmosphere. At the outset, Applicants respectfully submit that Wang does not teach or suggest a rapid thermal process chamber; but, a furnace tube system. The Office Action asserts, however, that the claimed pressure of 1 atmosphere is not enabled in the instant application.

For similar reasons provided above, Applicants respectfully disagree with the Office Action's assertion. The present application supports the claimed feature. Atmospheric pressure can be used when hydrogen and oxygen gases are not combined in the rapid thermal process reaction chamber. That is one claimed embodiment. In the second claimed embodiment, when hydrogen and oxygen gases are combined in the reaction chamber, a pressure of about 1 milliTorr is used. Accordingly, the feature recited in claim 13 that "the pressure of said rapid thermal process chamber is held at about atmospheric pressure," is supported by the instant application and is not taught or suggested by the cited references.

The Office Action relies upon Miner for disclosing that the ratio of steam relative to other gases in the chamber overlaps Applicants' claimed range of 0.1 to 0.5. The Office Action further asserts that Miner's "pressure is potentially about atmospheric pressure at least during a detonation of the hydrogen and oxygen gases." (pg. 12). Applicants respectfully submit that Miner does not teach or suggest these features as asserted. Further, there is no motivation to combine Miner with Wang. Further still, even if the references are properly combinable, they still would not teach or suggest all of the subject matter recited in claim 13.

Miner does not teach or suggest that the pressure can be potentially atmospheric pressure. In fact, Miner teaches away from the Office Action's assertion. For example, Miner discloses in FIG. 7, reactant gas mixtures of O_2 and H_2 at partial

pressures of 150 Torr (Col. 8, lines 44-45). FIG. 7 further illustrates that the detonation pressure in the RTP chamber is always less than 0.8 atmosphere. Miner does not teach that the rapid thermal process chamber is held at about atmospheric pressure, e.g., 760 Torr. Miner's FIG. 7 merely illustrates that the pressure within the RTP chamber fluctuates between 0.8 to 0.3 atmospheres. Miner even discloses that hydrogen and oxygen gases "can be safely used as long as the chamber partial pressure of the reactant gases is maintained at less than 150 Torr at process temperatures." (Col. 8, lines 63-65). There is no inference that Miner discloses a pressure that is potentially atmospheric in the RTP chamber as the Office Action asserts.

Miner does not teach or suggest that "the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5," as recited in claim 13. The Office Action relies upon Miner's col. 8, line 57 to col. 9, line 23 as disclosing Applicants' claimed feature. Miner, however in embodiment, merely discloses a hydrogen rich mixture utilizing H_2/O_2 ratios greater than 2:1, or an oxygen-rich mixture using H_2/O_2 ratios less than 0.5:1 (Col. 8, lines 57-63). In a second embodiment, Miner discloses that a reactant gas mixture comprising 10% or less H_2 and 90% or more O_2 can be used, or, a reactive gas mix comprising between 5-20% O_2 with the remainder H_2 95-80% (Col. 9, lines 1-23). There is no disclosure or suggestion, in Miner's col. 8, line 57 to col. 9, line 23, that the ratio of steam to other gases in the RTP reaction chamber is in the range from about 0.1 to about 0.5. In fact, there is no disclosure that any other gases are even present.

There is also no motivation to combine Wang and Miner. Wang discloses that "the WVA [wet vapor anneal] step [is performed] in a standard steam oxidation furnace . . . [and that] [t]he furnace tube which was at 380°C and the total WVA anneal time was about 30 minutes. " (Col. 3, lines 56-58). Wang's water vapor is provided "by using an infra-red lamp to heat up a tank of deionized (DI) water that was connected to

the tube. The heated DI water evaporated and flowed through the tube and over the devices that were being annealed." (Col. 3, lines 60-65). Wang uses deionized water evaporated to form steam, a furnace tube, and an anneal time of 30 minutes.

Miner, in contrast, discloses a RTP apparatus 200. It is not a furnace tube. Miner discloses that hydrogen and oxygen gas are combined in the reaction chamber at a pressure less than 150 Torr to make steam (Col. 8, lines 58-65). It is not evaporated deionized water. Miner further discloses that the wafer is "held at process temperatures for between 30 to 120 seconds." (Col. 10, lines 3-4). It is not an anneal time of 30 minutes.

In other words, Wang and Miner are completely different processes. Miner combines hydrogen and oxygen gas in a rapid thermal process chamber; Wang does not. Miner discloses a duration of 30 to 120 seconds; Wang discloses a duration of 30 minutes, or, about 15 times longer than Miner's process. Miner discloses combining hydrogen and oxygen gas to form steam; Wang discloses heating up a tank of deionized water that evaporates. There is no motivation to combine such disparate processes.

Moreover, even if the references are combinable, they still would not teach or suggest a method of "depositing a dielectric film . . . subjecting the dielectric film to a densifying treatment . . . subjecting said stabilized dielectric film to a wet oxidation with steam process . . . said steam being carried to the chamber, wherein the temperature of said chamber is from approximately 450 °C to about 1050°C, wherein said film is subjected to said process for a duration of about 20 seconds to about 60 seconds, wherein the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5 and the pressure of said rapid thermal process chamber is held at about atmospheric pressure," as recited in claim 13.

All of the claim limitations in claim 13 are not taught or suggested by Wang and Miner. See M.P.E.P. § 2143.03. Specifically, that the rapid thermal process chamber is held at about atmospheric pressure or that the ratio of steam to other gases in the chamber is in the range from about 0.1 to about 0.5.

Claims 14 and 17 depend from claim 13 and should be allowable along with claim 13 for at least the reasons provided above, and on their own merits. The § 103(a) rejection of claims 13, 14, and 17 should be withdrawn.

In addition, Applicants respectfully submit that the prior art of record does not teach or suggest the subject matter of newly added claim 44. Claim 44 recites, *inter alia,* a method of fabricating a semiconductor device comprising, "depositing a dielectric film . . . subjecting the dielectric film to a wet oxidation with steam process in a rapid thermal process chamber at a first temperature; and subjecting the dielectric film to a densifying treatment to stabilize said film at a second temperature, wherein said first temperature is less than said second temperature." The prior art of record does not teach or suggest that the densifying treatment's temperature should be greater than the wet oxidation with steam process temperature.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

By_____

Thomas J. D'Amico
Registration No.: 28,371
DICKSTEIN SHAPIRO MORIN &
OSHINSKY LLP
2101 L Street NW
Washington, DC 20037-1526
(202) 785-9700
Attorney for Applicants